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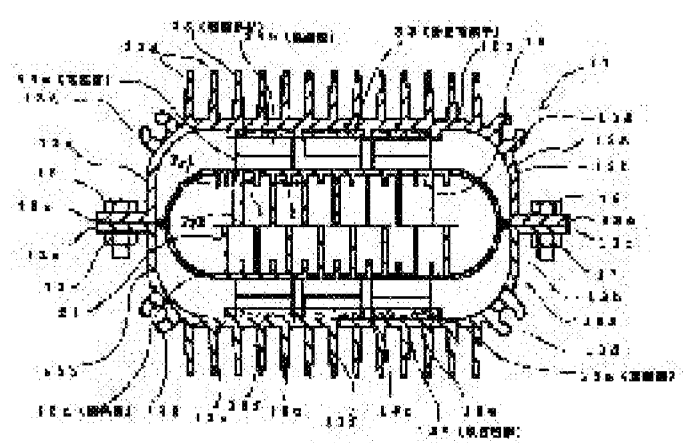
(54) **EXHAUST HEAT GENERATING DEVICE**

(57)Abstract:
PROBLEM TO BE SOLVED: To increase the generation of output and to achieve miniaturization by making heat collection efficiency satisfactory from exhaust gas in an exhaust heat generating device for heating a high-temperature end face through the exhaust gas of an internal combustion engine or others and for air-cooling or water-cooling a low-temperature end face.
SOLUTION: In an exhaust heat generating device, an exhaust pipe through which an exhaust gas G flows inside and a heat collecting surface 19a, where a heat collection fin 21 is formed are provided on at least one surface. The device has a flat-shaped internal cylinder 19 to which the exhaust gas G enters the inside from the exhaust pipe, an external cylinder 11 in which the internal cylinder is accommodated inside at intervals and



a radiating surface 13a being opposite to the heat collection surface 19a of the internal cylinder 19 is formed, and a thermoelectric conversion module 33 that is formed between the heat collecting surface 19a of the internal cylinder 19 and the radiating surface 13a of the external cylinder 11 and is adhered to the heat collection surface 19a. In the heat collection fin, a plurality of plate-shaped bodies with different heights are arranged, while being in parallel with the flow direction of the exhaust gas G with respect to a long axis direction, orthogonally crossing the flow direction of the exhaust gas G.

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* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The container liner of a flat configuration with which it has at least the exhaust pipe with which exhaust gas (G) flows inside, and the heat collecting surface (19a) where the collection-of-heat fin (21) was formed in the inside on the whole surface, and said exhaust gas (G) flows into the interior from said exhaust pipe (19), The outer case with which the heat sinking plane (13a) which said container liner (19) keeps spacing in the interior, is held in it, and counters said heat collecting surface (19a) of said container liner (19) is formed (11), It is arranged between said heat collecting surface (19a) of said container liner (19), and said heat sinking plane (13a) of said outer case (11). It has the thermoelectrical conversion module (33) stuck to an elevated-temperature end face (33a) in said heat collecting surface (19a). Said collection-of-heat fin (21) The exhaust heat power plant characterized by being constituted by arranging in parallel two or more plates (21a, 21b) with which height differs to the flow direction of exhaust gas (G) in the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas (G).
[Claim 2] It is the exhaust heat power plant characterized by the ratio (L/T) of the installation spacing (L) and thickness (T) of a plate (21a, 21b) being 10 / 3 - 10/10 in the direction of a major axis in which said collection-of-heat fin (21) intersects perpendicularly to the flow direction of exhaust gas (G) in a thermoelectrical inverter according to claim 1.
[Claim 3] In a thermoelectrical inverter according to claim 1 or 2 said collection-of-heat fin (21) In the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas (G), the plate (21a, 21b) which is two kinds from which height differs said direction of a major axis -- alternation -- and the exhaust heat power plant characterized by the ratio (Fyh/Fyl) of a high plate (21a, 21b) and a low plate (21a, 21b) being 2-6 while being constituted by arranging more than one in parallel to the flow direction of exhaust gas (G).
[Claim 4] The container liner of a flat configuration with which it has at least the exhaust pipe with which exhaust gas (G) flows inside, and the heat collecting surface (19a) where the collection-of-heat fin (21) was formed in the inside on the whole surface, and said exhaust gas (G) flows into the interior from said exhaust pipe (19), The outer case with which the heat sinking plane (13a) which said container liner (19) keeps spacing in the interior, is held in it, and counters said heat collecting surface (19a) of said container liner (19) is formed (11), It is arranged between said heat collecting surface (19a) of said container liner (19), and said heat sinking plane (13a) of said outer case (11). It has the thermoelectrical

conversion module (33) stuck to an elevated-temperature end face (33a) in said heat collecting surface (19a). Said collection-of-heat fin (21) The plate with which the upstream of exhaust gas (G) begins from Takabe while having Takabe and a pars basilaris ossis occipitalis by turns to the flow direction of exhaust gas (G) (21a), In the direction of a major axis which intersects perpendicularly to the flow direction of said exhaust gas (G) while having Takabe and a pars basilaris ossis occipitalis by turns and said upstream stands erect in parallel the plate (21b) which begins from a pars basilaris ossis occipitalis to the approach exhaust gas (G) flows The exhaust heat power plant characterized by being constituted by more than one's standing erect by turns in a heat collecting surface (19a), and arranging to it.
[Claim 5] It is the exhaust heat power plant characterized by being constituted by standing erect at fixed spacing in a thermoelectrical inverter according to claim 4 in the direction of a major axis which intersects perpendicularly to the flow direction of said exhaust gas (G) while said collection-of-heat fin (21) stands erect on the same axle from the field where said heat collecting surface (19a) faces said plate (21a) and plate (21b), and arranging.
[Claim 6] The exhaust heat power plant characterized by the ratios (Fxh/Fxl) of the peak price (Fxh) of the height of two or more plates (21a, 21b) and the minimum value (Fxl) which have said Takabe and pars basilaris ossis occipitalis by turns being 2-6 in a thermoelectrical inverter according to claim 4 or 5.
[Claim 7] In the thermoelectrical inverter of claim 4 thru/or claim 6 given in any 1 term As said Takabe and pars basilaris ossis occipitalis Two or more plates which it has by turns The peak price of the height of (21a, 21b) The distance (D) to the following arithmetic average height value (Fm= (Fxh+Fxl)/2) and the flow direction of exhaust gas (G) are received through the minimum value (Fxl) from the arithmetic average height value (Fm= (Fxh+Fxl)/2) computed from (Fxh) and the minimum value (Fxl). The exhaust heat power plant characterized by the ratios (D/T) of the thickness (T) of the plate (21a, 21b) in the direction of a major axis which intersects perpendicularly being 3-30.
[Claim 8] In a thermoelectrical inverter according to claim 1 the height of said plate (21a, 21b) when the height of the plate (21a, 21b) set in the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas (G) is a peak price (Fxh), the height of the plate (21a, 21b) which adjoins each other serves as the minimum value (Fxl) -- as -- the flow direction of exhaust gas (G) -- meeting -- the account plate of zinc (21a --) The exhaust heat power plant characterized by preparing Takabe and a pars basilaris ossis occipitalis in 21b by turns, and the ratio (L/T) of the installation spacing (L) and thickness (T) of each plate (21a, 21b) having become 10 / 3 - 10/10.
[Claim 9] The exhaust heat power plant characterized by the ratios (Fyh/Fyl) of the peak price (Fyh) of the height of said plate (21a, 21b) and the minimum value (Fyl) being 2-6 in a thermoelectrical inverter according to claim 8.
[Claim 10] In a thermoelectrical inverter according to claim 8 or 9 The distance (D) to the following arithmetic average height value (Fm= (Fyh+Fyl)/2) and the flow direction of exhaust gas (G) are received through the minimum value (Fyl) from the arithmetic average height value (Fm= (Fyh+Fyl)/2) computed from said peak price (Fyh) and minimum value (Fyl). The exhaust heat power plant characterized by the ratios (D/T) of the thickness (T) of the plate (21a, 21b) in the direction of a major axis which intersects perpendicularly being 3-30.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the exhaust heat power plant for collecting exhaust heat of the exhaust gas discharged from the engine of an automobile etc., and changing into power.
[0002]
[Description of the Prior Art] Conventionally, at the automobile which discharges hot exhaust gas, and works, in order to collect heat energy from exhaust heat of the exhaust gas discharged from an engine, a furnace, etc. and to change into power, JP,61-254082,A, JP,63-262075,A, JP,6-79168,U, and the exhaust heat power plant indicated by "thermoelectrical conversion system technical conspectus" (the 162nd page (1995) of incorporated company rear rise company issue) are used widely.
[0003] Drawing 11 shows the exhaust heat power plant indicated by JP,63-262075,A, and the endoergic cube type-like cylinder 2 is infixed in the exhaust pipe 1 with which the exhaust gas discharged from the engine of an automobile flows in this exhaust heat power plant. The flat surface which counters is formed in the endoergic cylinder 2, and the fin which attached the include angle to the flow of exhaust gas is installed in it.
[0004] The thermoelectrical conversion module 3 counters, and is arranged and the elevated-temperature end face of the thermoelectrical conversion module 3 and the flat surface of the endoergic cylinder 2 are joined by flat surfaces, such as this. And the cooling jacket 4 with which cooling water returns to the interior counters, and is arranged, and the low-temperature end face of the thermoelectrical conversion module 3 and the cooling surface of a cooling jacket 4 are joined to the low-temperature end-face side of the thermoelectrical conversion module 3.
[0005] In the exhaust heat power plant mentioned above, hot exhaust heat of the exhaust gas which flowed from the exhaust pipe 1 conducts to the elevated-temperature end face of the thermoelectrical conversion module 3 through the flat surface of the endoergic cylinder 2. Moreover, the low-temperature end face of the thermoelectrical conversion module 3 is cooled by coincidence with the cooling water of the low temperature which returns the inside of a cooling jacket 4. And since thermoelectromotive force occurs and is generated according to the temperature gradient produced between the elevated-temperature end face of the thermoelectrical conversion module 3, and the low-temperature end face (Seebeck effect), heat energy can be collected from exhaust heat of exhaust gas, it can change into power, and energy can be used effectively.

[0006] Drawing 12 shows the exhaust heat power plant indicated by JP,61-254082,A, and the container liner 6 of a cross-section circle configuration is infixed in the exhaust pipe 5 with which the exhaust gas discharged from the engine of an automobile flows in this exhaust heat power plant. The outer case 7 of a cross-section circle configuration is arranged, and a container liner 6 and an outer case 7 keep spacing, and are arranged concentrically on the outside of this container liner 6.
[0007] Between the peripheral face of a container liner 6, and the inner skin of an outer case 7, two or more thermoelectric elements 8 are arranged in the shape of a circular ring. An elevated-temperature end face counters a container liner 6 side, a low-temperature end face counters an outer case 7 side, and the thermoelectric elements 8, such as this, are arranged. In the exhaust heat power plant mentioned above, hot exhaust heat of the exhaust gas which flowed from the exhaust pipe 5 conducts to the elevated-temperature end face of a thermoelectric element 8 through a container liner 6, and the heat of a low-temperature end face radiates heat outside through an outer case 7.
[0008] And since thermoelectromotive force occurs and is generated according to the temperature gradient produced between the low-temperature end face of a thermoelectric element 8, and the elevated-temperature end face, heat energy can be collected from exhaust heat of exhaust gas, it can change into power, and energy can be used effectively. Moreover, in order to install a thermoelectric element between the container liners and outer cases of a cross-section circle configuration and to improve heat transfer from exhaust gas, the configuration which prepared the heat exchanger which has the diffuser which becomes from two or more openings inside a container liner is indicated by JP,6-79168,U.
[0009] Moreover, the configuration which installed diffusion and the spiral diffuser for carrying out a turbulent flow is indicated by "the thermoelectrical conversion system technical conspectus" (the 162nd page) in exhaust gas in the container liner of a cross-section circle configuration.
[0010]
[Problem(s) to be Solved by the Invention] however, the sense of the fin prepared in the exhaust gas path side endothermic surface of a heat sink although the configuration of a heat sink was made into the flat configuration and layout constraint was eased in the exhaust heat power plant indicated by JP,63-262075,A mentioned above -- an exhaust gas flow direction -- receiving -- an include angle -- **** -- since it was, there was a problem that ventilation resistance got worse with these fins.
[0011] Moreover, in the exhaust heat power plant indicated by JP,61-254082,A mentioned above, since exhaust heat of exhaust gas was conducted to the elevated-temperature end face of a thermoelectric element 8 through the container liner 6 of a cross-section circle configuration, it could not flow out, while it had been in the condition that the exhaust gas which flows the core of a container liner 6 flowed, and exhaust heat of the exhaust gas which flows a core could not be collected, but there was a problem that the heat generating efficiency of a thermoelectric element 8 was bad.
[0012] Moreover, since the thermoelectric element 8 was arranged in the shape of a circular ring, the surface area of the elevated-temperature end face of a thermoelectric element 8 was smaller than the surface area of a low-temperature end face to the degree of pole, and the problem that the recovery effectiveness of exhaust heat of exhaust gas was bad was between the container liners 6 and outer cases 7 which are arranged concentrically. Furthermore, in JP,6-79168,U mentioned above, since the heat exchanger to which an exhaust pipe and a thermoelectric element are located in a concentric circle configuration, and have a diffuser inside a container liner is prepared, in order to lower ventilation resistance, the configuration needed to be enlarged, large spacing of these mutuals needed to be taken, and there was a problem of receiving the constraint on a layout.

[0013] It was made in order that this invention might solve this conventional problem, and the purpose heats an elevated-temperature end face with the exhaust gas of an internal combustion engine or in addition to this combustion, and a generation-of-electrical-energy output is greatly by making collector efficiency from exhaust gas good for a low-temperature end face in air cooling or the exhaust heat power plant which carries out water cooling to offer a compact exhaust heat power plant. Another purpose of this invention is to offer the exhaust heat [which can be used for the heat power plant for mount which collects and generates exhaust heat of the exhaust gas of an automobile engine] power plant which it is compact, is reliable and can carry out air cooling more in the style of transit while raising the thermal conductivity from exhaust gas to the elevated-temperature edge of a thermoelectrical conversion module.

[0014]

[Means for Solving the Problem] The container liner of a flat configuration with which an exhaust heat power plant according to claim 1 has at least the exhaust pipe with which exhaust gas flows inside, and the heat collecting surface where the collection-of-heat fin was formed in the inside on the whole surface, and exhaust gas flows into the interior from an exhaust pipe, The outer case with which the heat sinking plane which a container liner keeps spacing in the interior, is held in it, and counters the heat collecting surface of a container liner is formed, It is arranged between the heat collecting surface of a container liner, and the heat sinking plane of an outer case, and has the thermoelectrical conversion module stuck to an elevated-temperature end face in a heat collecting surface. A collection-of-heat fin In the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas, it is characterized by being constituted by arranging in parallel two or more plates with which height differs to the flow direction of exhaust gas.

[0015] An exhaust heat power plant according to claim 2 is characterized by the ratio of the installation spacing and thickness of a plate being 10 / 3 - 10/10 in a thermoelectrical inverter according to claim 1 in the direction of a major axis in which a collection-of-heat fin intersects perpendicularly to the flow direction of exhaust gas. two or more plates with which collection-of-heat fins differ in height in a thermoelectrical inverter according to claim 1 or 2 in the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas in an exhaust heat power plant according to claim 3 -- the direction of a major axis -- alternation -- and while being constituted by arranging more than one in parallel to the flow direction of exhaust gas, it is characterized by the ratio of a high plate and a low plate being 2-6.

[0016] The container liner of a flat configuration with which an exhaust heat power plant according to claim 4 has at least the exhaust pipe with which exhaust gas flows inside, and the heat collecting surface where the collection-of-heat fin was formed in the inside on the whole surface, and exhaust gas flows into the interior from an exhaust pipe, The outer case with which the heat sinking plane which a container liner keeps spacing in the interior, is held in it, and counters the heat collecting surface of a container liner is formed, It is arranged between the heat collecting surface of a container liner, and the heat sinking plane of an outer case, and has the thermoelectrical conversion module stuck to an elevated-temperature end face in a heat collecting surface. A collection-of-heat fin The plate with which the upstream of exhaust gas begins from Takabe while having Takabe and a pars basilaris ossis occipitalis by turns to the flow direction of exhaust gas, It is characterized by being constituted by more than one's standing erect by turns in a heat collecting surface, and arranging to it the plate with which the upstream begins from a pars basilaris ossis occipitalis while having Takabe and a pars basilaris ossis occipitalis by

turns in the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas, while standing erect in parallel to the approach exhaust gas flows.

[0017] An exhaust heat power plant according to claim 5 is characterized by constituting the collection-of-heat fin by standing erect and arranging a plate and a plate at fixed spacing, in the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas, while standing erect on the same axle from the field where a heat collecting surface faces in a thermoelectrical inverter according to claim 4.

[0018] An exhaust heat power plant according to claim 6 is characterized by the ratios of the peak price of the height of two or more plates and the minimum value which have Takabe and a pars basilaris ossis occipitalis by turns being 2-6 in a thermoelectrical inverter according to claim 4 or 5. An exhaust heat power plant according to claim 7 is set to the thermoelectrical inverter of claim 4 thru/or claim 6 given in any 1 term. It is characterized by the ratios of the thickness of the plate in the direction of a major axis which intersects perpendicularly to the distance to the following arithmetic average height value and the flow direction of exhaust gas through the minimum value from the arithmetic average height value computed from the peak price and the minimum value of the height of two or more plates which it has by turns as Takabe and a pars basilaris ossis occipitalis being 3-30.

[0019] An exhaust heat power plant according to claim 8 is set to a thermoelectrical inverter according to claim 1. The height of a plate Takabe and a pars basilaris ossis occipitalis are prepared in the account plate of zinc by turns along the flow direction of exhaust gas so that the height of the plate which adjoins each other when the height of the plate set in the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas is a peak price may serve as the minimum value. And it is characterized by the ratio of the installation spacing and thickness of each plate being 10 / 3 - 10/10.

[0020] An exhaust heat power plant according to claim 9 is characterized by the ratios of the peak price of the height of a plate and the minimum value being 2-6 in a thermoelectrical inverter according to claim 8. An exhaust heat power plant according to claim 10 is characterized by the ratios of the thickness of the plate in the direction of a major axis which intersects perpendicularly to the distance to the following arithmetic average height value and the flow direction of exhaust gas through the minimum value from the arithmetic average height value computed from a peak price and the minimum value being 3-30 in a thermoelectrical inverter according to claim 8 or 9.

[0021] (Operation) Two or more plates with which height differs in an exhaust heat power plant according to claim 1 in the direction of a major axis which intersects perpendicularly with the heat collecting surface of a container liner to the flow direction of exhaust gas Since the collection-of-heat fin is prepared by arranging in parallel to the flow direction of exhaust gas After the exhaust gas which flowed into the container liner is spread along a heat collecting surface from an exhaust pipe, it conducts to the elevated-temperature end face of a thermoelectrical conversion module through the collection-of-heat fin which exhaust heat of exhaust gas prepared in the heat collecting surface of a container liner, and the elevated-temperature end face of a thermoelectrical conversion module is heated.

[0022] Moreover, heat is radiated on the outside of an outer case from the radiation fin with which the heat of the low-temperature end face of a thermoelectrical conversion module was really formed in coincidence through the heat sinking plane of an outer case, and the low-temperature end face of a thermoelectrical conversion module is cooled. And according to the temperature gradient produced between the elevated-temperature end face of a thermoelectrical conversion module, and the low-

temperature end face, thermoelectromotive force occurs and is generated.

[0023] Collector efficiency can be raised in an exhaust heat power plant according to claim 2, without increasing the ventilation resistance of exhaust gas. Collector efficiency can be raised in an exhaust heat power plant according to claim 3, maintaining the effectiveness which exhaust gas diffuses. In an exhaust heat power plant according to claim 4, since exhaust gas is spread, it branches to two or more passage and disturbance reduction is caused with the level difference by the side of the opposed face of the plate which adjoins each other, exhaust gas temperature can be certainly spread to each plate.

[0024] In an exhaust heat power plant according to claim 5, an operation of an exhaust heat power plant according to claim 4 can be raised much more. In an exhaust heat power plant according to claim 6, ventilation resistance can be controlled and collector efficiency can be raised. The diffuser efficiency of exhaust gas can be raised in an exhaust heat power plant according to claim 7.

[0025] Collector efficiency can be raised in an exhaust heat power plant according to claim 8, without making the ventilation resistance of exhaust gas increase. Collector efficiency can be raised in an exhaust heat power plant according to claim 9, without making the ventilation resistance of exhaust gas increase. Collector efficiency can be raised in an exhaust heat power plant according to claim 10, without making the ventilation resistance of exhaust gas increase.

[0026]

[Embodiment of the Invention] Hereafter, the operation gestalt which shows the detail of this invention to a drawing is explained. Drawing 1 thru/or drawing 3 show 1 operation gestalt (it corresponds to claim 1 thru/or claim 3) which was adapted for the exhaust air system of an automobile in the exhaust heat power plant of this invention, and the sign 11 shows the outer case with which a cross-section configuration is formed in a rectangle flat configuration in drawing.

[0027] As shown in drawing 1 and drawing 2 , the outer case 11 is divided in the flow direction of straight side (x axis), i.e., direction, of exhaust gas G, and it has upper uta shell 13A and ROAA uta shell 13B by which this opening side counters and is arranged while the cross-section (y-z cross section) configuration in the direction of a major axis (z-axis) which intersects perpendicularly to the flow direction of exhaust gas G makes the shape of a KO typeface.

[0028] As upper uta shell 13A, such as this, and ROAA uta shell 13B, as shown in drawing 2 , it has plane heat sinking plane 13a. Heat sinking plane 13a and side-face 13b crooked in the same direction at the right angle are formed in the both ends of heat sinking plane 13a, and upper uta shell 13A and ROAA uta shell 13B are formed in the U shape, respectively.

[0029] Bolt fixed rib 13c which projects outside in parallel with heat sinking plane 13a is really formed at the tip of side-face 13b, such as this. Moreover, bis-attachment rib 13d of a radii configuration is really formed in both the corners of upper uta shell 13A and ROAA uta shell 13B for the inner skin configuration. 13g of two or more radiation fins which project in the method of outside is really formed in the outside of upper uta shell 13A and heat sinking plane 13a of ROAA uta shell 13B.

[0030] And after upper uta shell 13A and ROAA uta shell 13B hold the thermoelectrical conversion module 33 mentioned later and hold the inner shell (container liner) 19 mentioned later, they insert in a bolt 15 from the upper uta shell 13A side, and are fixed to the bolt insertion hole (not shown) by which two or more formation is carried out at bolt fixed rib 13c by screwing a nut 17 in a bolt 15 from the ROAA uta shell 13B side.

[0031] Moreover, with this operation gestalt, it consists of a stainless steel plate, and as shown in drawing 1 and drawing 2 , the inner shell (container liner) 19 of an ellipse flat configuration keeps

spacing inside an outer case 11, and the cross-section configuration (y-z cross section) is held in it. While an inner shell 19 is connected to the exhaust pipe (not shown) of the engine of an automobile, 13g of radiation fins of an outer case 11 is infixed so that it may meet in the transit direction of an automobile, and let mostly the minor-axis dimension (the direction of the y-axis) of an inner shell 19 be the same dimension with the diameter dimension of an exhaust pipe with this operation gestalt.

[0032] And the connection between an inner shell 19 and an exhaust pipe is made through the diffuser (not shown) whose diameter was expanded in the major-axis direction (the direction of the z-axis). This diffuser is installed between the exhaust pipes which are the inner shell 19 and circular configuration whose cross section is elliptical, tubing with which configurations differ is connected, and it is installed in order to pass exhaust gas efficiently on the inner shell 19 interior and collection-of-heat fin 21 front face mentioned later.

[0033] The description of this invention is in the configuration of the collection-of-heat fin 21 installed in the inner shell 19 interior, and it does not depend for it on the configuration of a diffuser. The inner shell 19 has heat collecting surface 19a which keeps upper uta shell 13A, heat sinking plane 13a of ROAA uta shell 13B, and spacing, and is formed in parallel. Inside heat collecting surface 19a, as shown in drawing 2 and drawing 3 , the collection-of-heat fin 21 is formed.

[0034] The collection-of-heat fin 21 is arranged in parallel to the flow direction (the direction of a x axis) of exhaust gas G. And in drawing 2 which is the y-z sectional view cut off along with the II-II line perpendicular to a x axis in a certain point in drawing 1 , the collection-of-heat fin 21 with which it comes to carry out two or more installation of the plates 21a and 21b with which height differs in the direction of a minor axis (y-axis) in the major-axis direction (the direction of the z-axis) is formed (it corresponds to claim 1).

[0035] it is shown in drawing 2 -- as -- the ratio of the installation spacing L of Plates 21a and 21b, and thickness T -- L/T is installed so that it may become 2/1 -- having (it corresponding to claim 2) -- the ratio of the height of two more kinds of plates 21a and 21b -- it is installed so that Fyh/Fyl may be set to 4 (it corresponds to claim 3). Here, plate 21a was made into the high value Fyh, and plate 21b was made into the low value Fyl.

[0036] the ratio of the installation spacing L of Plates 21a and 21b, and thickness T -- it is desirable to be referred to as 10 / 3 - 10/10, and if L/T exceeds 10/3, since the effectiveness of L/T of raising collector efficiency is small, it is not desirable. Moreover, it increases [ventilation resistance becomes / L/T / large less than by 10/10, or / the weight of the inner shell 19 whole] and is not desirable. the ratio of the height of two kinds of plates 21a and 21b -- 2-6 are desirable, and since the effectiveness of Fyh/Fyl that Fyh/Fyl diffuses exhaust gas less than in two is small, its effectiveness of raising collector efficiency is small. Since the surface area of the collection-of-heat fin 21 will become small too much while the spreading effect of exhaust gas becomes small if Fyh/Fyl exceeds 6, the improvement effectiveness of collector efficiency is not small desirable.

[0037] An inner shell 19 has emission inlet-port 19b in the inflow side of exhaust gas G, and has emission outlet 19c in the outflow side. With this operation gestalt, the outside tip of the collection-of-heat fin 21 arranged at the emission inlet-port 19b side of an inner shell 19 has extended outside the end face of upper uta shell 13A and ROAA uta shell 13B, as shown in drawing 3 .

[0038] To the periphery of emission inlet-port 19b of an inner shell 19, fitting of the ellipse annulus-like inflow side exhaust pipe mounting flange 23 is carried out, and it is being fixed to the inner shell 19 by full circled welding. Furthermore, to the periphery of emission outlet 19c, fitting of the ellipse annulus-

like outflow side exhaust pipe mounting flange 25 is carried out, and it is being fixed to the inner shell 19 by full circled welding.
[0039] Moreover, as shown in the lateral surface of an inner shell 19 at drawing 1 and drawing 3 , near the both-ends side of upper uta shell 13A and ROAA uta shell 13B, the outer shell stationary plate 27 of a pair counters, and is arranged, and it is being fixed to the inner shell 19 by welding. Bis-insertion hole 27a of a slot configuration is formed in the location corresponding to bis-attachment rib 13d of upper uta shell 13A and ROAA uta shell 13B at the outer shell stationary plate 27.
[0040] Between the outer shell stationary plate 27 and the both-ends side of upper uta shell 13A and ROAA uta shell 13B, the bracket 29 of the pair corresponding to the peripheral face configuration of an inner shell 19 in the end-face configuration by the side of an inner shell 19 is pinched. An inner shell 19, and upper uta shell 13A and ROAA uta shell 13B are being fixed by screwing in bis-attachment rib 13d the screw 31 which inserts in bis-insertion hole 27a of the outer shell stationary plate 27.
[0041] That is, the space between upper uta shell 13A, heat sinking plane 13a of ROAA uta shell 13B, and heat collecting surface 19a of an inner shell 19 is blockaded with the bracket 29. And between upper uta shell 13A, heat sinking plane 13a of ROAA uta shell 13B, and heat collecting surface 19a of an inner shell 19, as shown in drawing 2 , two or more arrangement of the thermoelectrical conversion module 33 is carried out.
[0042] The thermoelectrical conversion module 33 is held so that elevated-temperature end-face 33a may counter heat sinking plane 13a, and 60 thermoelectrical conversion modules 33 are held with this operation gestalt. The output terminal which takes out generated output is attached in low-temperature end-face 33b, and the thermoelectrical conversion module 33 can be electrically connected to a serial or juxtaposition according to desired generated output, exhaust gas, and the operation situation of the air-cooling style.
[0043] The thermoelectrical conversion module 33 used here is the aggregate of a thermoelement with which two or more thermoelement pairs which consist of a p type semiconductor and a n-type semiconductor were thermally joined to juxtaposition by the serial through the electrode electrically formed in the both ends of a component pair. This thermoelectrical conversion module 33 can also take the configuration with which the opening between the thermoelements in the thermoelectrical conversion module 33 was fill uped by the heat insulation insulation matter according to the environment used or the property of a semi-conductor.
[0044] As for this thermoelectrical conversion module 33, the thermoelectrical conversion module of the cube mold whose elevated-temperature end-face 33a and low-temperature end-face 33b in which the electrode was formed are an parallel flat surface is used. This has high versatility and has the description suitable for mass production method. Moreover, the electric insulation with the thermoelectrical conversion module 33, an inner shell 19, or an outer case 11 can be performed also by being able to do also by preparing an insulating layer on the both-ends side of the thermoelectrical conversion module 33 with which the electrode was formed, and carrying out insulating processing of the front face of an inner shell 19 or an outer case 11 where the thermoelectrical conversion module 33 contacts at least.
[0045] The buffer member 35 is pinched between heat sinking plane 13a of an outer case 11, and low-temperature end-face 33b of the thermoelectrical conversion module 33. This buffer member 35 is a member which has moderate flexibility while it is excellent in heat transfer nature, and it has the function in which the temperature change of rapid exhaust gas and the temperature change of the inner shell 19 accompanying flow rate change buffer the thermal shock given to elevated-temperature end-

face 33a of the thermoelectrical conversion module 33 while it has the function which buffers mechanical oscillation, when it presses the thermoelectrical conversion module 33 to heat collecting surface 19a of an inner shell 19.
[0046] In the exhaust heat power plant mentioned above, after exhaust gas G which flowed into emission inlet-port 19b of an inner shell 19 is spread along with heat collecting surface 19a from an exhaust pipe, the collection of heat of the exhaust heat of exhaust gas G is carried out with the collection-of-heat fin 21 of an inner shell 19, this exhaust heat conducts through heat collecting surface 19a to elevated-temperature end-face 33a of the thermoelectrical conversion module 33, and elevated-temperature end-face 33a of the thermoelectrical conversion module 33 is heated.
[0047] Moreover, the heat of low-temperature end-face 33b of the thermoelectrical conversion module 33 radiates heat from 13g of radiation fins on which a transit wind is sprayed on the outside of an outer case 11 through upper uta shell 13A and heat sinking plane 13a of ROAA uta shell 13B to coincidence, and low-temperature end-face 33b of the thermoelectrical conversion module 33 is cooled. And according to the temperature gradient produced between elevated-temperature end-face 33a of the thermoelectrical conversion module 33, and low-temperature end-face 33b, thermoelectromotive force occurs to the thermoelectrical conversion module 33, and is generated.
[0048] Moreover, it is pressed and stuck to low-temperature end-face 33b of the thermoelectrical conversion module 33 inside upper uta shell 13A and heat sinking plane 13a of ROAA uta shell 13B according to the elastic force of the buffer member 35 pinched between low-temperature end-face 33b of the thermoelectrical conversion module 33, and heat sinking plane 13a of an outer case 11. In the exhaust heat power plant constituted as mentioned above, inside the outer case 11 which consists of upper uta shell 13A and ROAA uta shell 13B From an exhaust pipe, spacing is kept in the interior and the inner shell 19 of the ellipse flat configuration where exhaust gas G flows is held in it. Between heat collecting surface 19a of an inner shell 19, and heat sinking plane 13a of an outer case 11 The thermoelectrical conversion module 33 which is stuck to elevated-temperature end-face 33a by heat collecting surface 19a, and low-temperature end-face 33b pinches the buffer member 35, and is stuck to it inside heat sinking plane 13a is arranged. Two or more plate 21a from which the height seen from the cross section (y-z cross section) in the major-axis (z-axis) direction which intersects perpendicularly with heat collecting surface 19a of an inner shell 19 to the flow direction of a major axis (x axis), i.e., direction, of exhaust gas G differs, Since the collection-of-heat fin 21 which consists of 21b was installed in parallel with a longitudinal direction (the direction of a x axis) While being able to raise the heat transfer effectiveness from exhaust gas G to elevated-temperature end-face 33a of the thermoelectrical conversion module 33 which flowed into the inner shell 19 and being able to make a big temperature gradient by this act on the thermoelectrical conversion module 33 certainly Thermoelectrical conversion efficiency can be improved more sharply than before.
[0049] Moreover, by considering as the inner shell 19 of a flattened section configuration which installed the collection-of-heat fin 21, the thermoelectrical conversion module 33 of a cube mold with high versatility can be installed, it is compact and collector efficiency can make it high. Furthermore, it is effective in the ability to operate a thermoelectrical inverter, without worsening the engine operation effectiveness in which exhaust gas G is generated, or applying an unnecessary operating duty, since heat energy can be efficiently transmitted from exhaust gas G, without raising ventilation resistance by installing the collection-of-heat fin 21.
[0050] Furthermore, since 13g of radiation fins of an outer case 11 was infixed so that it might meet in

the transit direction of an automobile while connecting the inner shell 19 with the exhaust pipe of the engine of an automobile, heat can be certainly radiated by the transit wind sprayed on 13g of radiation fins. Furthermore, since the inner shell 19 and the collection-of-heat fin 21 were formed with the stainless steel plate, the corrosion by exhaust gas G can be prevented certainly.

[0051] Moreover, with the operation gestalt mentioned above, as shown in drawing 3 , the outside tip of the collection-of-heat fin 21 arranged at the emission inlet-port 19b side of an inner shell 19 Since it extended outside the end face of upper uta shell 13A and ROAA uta shell 13B The cold from the peripheral face of the inner shell 19 exposed to the outside of an outer case 11 can prevent conducting to the emission inlet-port 19b side of elevated-temperature end-face 33a of the thermoelectrical conversion module 33, and can conduct exhaust heat to homogeneity at elevated-temperature end-face 33a of the thermoelectrical conversion module 33.

[0052] In addition, with this operation gestalt mentioned above, although the outer case 11 explained the thermoelectric generation equipment of the air-cooling mold which used APPA outer shell 13A and ROAA uta shell 13B by which 13g of radiation fins was really fabricated, it can also be considered as water cooling with which the outer case 11 has water cooled jacket structure, or the type cooled with a refrigerant in addition to this. Moreover, although the operation gestalt mentioned above explained the example which collected and generated exhaust heat of exhaust gas G which infixes an inner shell 19 in an engine exhaust pipe, and is discharged from the engine of an automobile, this invention is not limited to this operation gestalt, and can also collect and generate exhaust heat of the exhaust gas discharged from the furnace of works etc.

[0053] Furthermore, with the operation gestalt mentioned above, as a collection-of-heat fin 21 prepared inside heat collecting surface 19a of an inner shell 19, as shown in drawing 2 and drawing 3 Although the case of the plates 21a and 21b with which it comes to carry out two or more arrangement of the collection-of-heat fin 21 which consists of two kinds of stainless steel plates in parallel with a longitudinal direction (the direction of a x axis) was explained, this invention can also constitute not only this but the collection-of-heat fin 21 from three or more kinds of plates. It becomes possible by making it the collection-of-heat fin 21 as shown in drawing 4 and drawing 5 to raise the collection-of-heat engine performance more.

[0054] In the exhaust heat power plant shown in drawing 4 thru/or drawing 7 , it is considering as the square shape flat configuration of half cut of the inner shell 19 which consists of a stainless steel plate in drawing 1 . Since other structures are the same as that of drawing 1 , an outer case 11 and a thermo-electric generating element 33 are omitted and explained. The collection-of-heat fin configuration of exhaust heat power-plant (b) shown in drawing 4 (A) and (B) Two or more plates 21a and 21b with which height differs are parallel to the flow direction of exhaust gas G, i.e., a longitudinal direction, (the direction of a x axis) like drawing 1 -3. the ratio of the high height Fyh of plate 21a in the cross section (y-z cross section) of the direction of a major axis (z-axis) where the ratio of the installation spacing L and thickness T intersects perpendicularly to the flow direction of L/T=4/3, and exhaust gas G, and the height Fyl of low plate 21b -- it is installed so that Fyh/Fyl may be set to 3.

[0055] Although [this operation gestalt / high plate 21a] the inner shell 19 was made into the square shape flat configuration of 2 rates and it is equivalent to the height of one side of an inner shell 19, it can also consider as an elliptic type flat configuration or a polygon mold flat configuration, and the high height of plate 21a can also be made higher than the height of one side of an inner shell 19. As for

exhaust heat power-plant (**) shown in drawing 5 (A) and (B), two or more plates 21a and 21b were installed in parallel by the longitudinal direction (the direction of a x axis) inside heat collecting surface 19a of an inner shell 19, and the height of one plate 21a and 21b is equipped with the collection-of-heat fin 21 modulated to the longitudinal direction (the direction of a x axis).

[0056] The modulation of the height of the plates 21a and 21b in this invention means continuous and periodic change of the height of Plates 21a and 21b, or pulse-shape-like change. Drawing 5 (A) is the sectional view of the longitudinal direction (the direction of a x axis) of the collection-of-heat fin 21 of exhaust heat power-plant (**), and (B) is the cross-section (y-z cross section) Fig. of the direction of a major axis (the direction of the z-axis) which intersects perpendicularly to the flow direction of exhaust gas G in emission inlet-port 19b of this fin 1.

[0057] This collection-of-heat fin 21 has Takabe and a pars basilaris ossis occipitalis by turns, as shown in drawing 5 (A), it consists of plate 21a in which the upstream of exhaust gas G begins from Takabe of a peak price Fxh, and plate 21b in which a ** side begins from the pars basilaris ossis occipitalis of the minimum value Fxl, and two or more sheets of these plates 21a and 21b are installed in the flow direction (the direction of a x axis) of exhaust gas G in parallel. That is, in the cross section of the direction of a major axis (the direction of a x axis), as shown in drawing 5 (B), plate 21a in which the end face of Takabe of a peak price Fxh appears, and plate 21b in which the end face of the pars basilaris ossis occipitalis of the minimum value Fxl appears are the arrangement by which two or more arrays were carried out by turns.

[0058] And plate 21a from which the exhaust gas inlet-port 19b side begins in Takabe is becoming irregular with the Takabe-pars-basilaris-ossis-occipitalis-Takabe-pars-basilaris-ossis-occipitalis-Takabe-pars basilaris ossis occipitalis, and plate 21b from which the exhaust gas inlet-port 19b side begins at the pars basilaris ossis occipitalis is becoming irregular with pars-basilaris-ossis-occipitalis-Takabe-pars-basilaris-ossis-occipitalis-Takabe-pars-basilaris-ossis-occipitalis-Takabe so that clearly from drawing 5 (A) (it corresponds to claims 4 and 5). Furthermore, in order to control ventilation resistance and to raise collector efficiency, as for the ratio of Fxh/Fxl, 2-6 are desirable. If a Fxh/Fxl ratio exceeds 6, since the spreading effect of exhaust gas is small, the improvement effectiveness of collector efficiency becomes small or ventilation resistance increases, it is not desirable. Although processing cost requires a Fxh/Fxl ratio less than by two, since collector efficiency does not increase, it is not desirable (it corresponds to claim 6).

[0059] moreover, the distance D (refer to drawing 5 (A)) to the point which shows the following arithmetic average height value Fm through the point that height shows the minimum value, from the point on an exhaust gas flow direction (the direction of a x axis) with arithmetic average height value Fm= (Fxh+Fxl) / 2 of a peak price Fxh and the minimum value Fxl in order to raise the diffuser efficiency of exhaust gas and the ratio of thickness T -- as for D/T, 3-30 are desirable. Since exhaust gas cannot be enough spread less than in three, as for the improvement width of face of collector efficiency, D/T does not have this better ** considering the increment in processing cost small. Moreover, since exhaust gas cannot be spread enough but processing cost increases sharply also when T exceeds D/30, it is not desirable (it corresponds to claim 7).

[0060] Moreover, the description whose ratios of Fxh/Fxl height becomes irregular to a longitudinal direction (the direction of a x axis), and are 2-6 at a longitudinal direction (the direction of a x axis) or from the point on a longitudinal direction (the direction of a x axis) with arithmetic average height value

Fm= (Fxh+Fxl) / 2 of a peak price Fxh and the minimum value Fxl the distance D to the point which shows the following arithmetic average height value Fm through the point which shows the minimum value Fxl, and the ratio of thickness T, while D/T has the description which are 3-30 the cross section (y-z cross section) in the direction of a major axis (the direction of the z-axis) which intersects perpendicularly with a longitudinal direction (the direction of a x axis) -- the ratio of the installation spacing L and thickness T -- it is possible to form the collection-of-heat fin 21 which has the description whose L/T is 10 / 3 - 10/10.

[0061] If the description in a longitudinal direction (the direction of a x axis) or the description in the cross section (y-z cross section) in the direction of a major axis (the direction of the z-axis) which intersects perpendicularly with a longitudinal direction (the direction of a x axis) is filled with the collection-of-heat fin 21 of this invention Although it is possible to demonstrate the effectiveness of raising collector efficiency, without achieving the purpose of this invention and making ventilation resistance increase, collector efficiency can be further raised by forming the collection-of-heat fin with which are satisfied of both descriptions.

[0062] Therefore, it is effective to establish similarly various structures, such as to prepare Takabe of the plates 21a and 21b of exhaust heat power-plant (**) (refer to drawing 5 (A) and (B)) and a pars basilaris ossis occipitalis in exhaust heat power-plant (**) (to refer to drawing 3 (A) and (B)) by turns, (it corresponds to claims 8, 9, and 10). Moreover, the collection-of-heat fins 21 of this invention are two or more plates 21a and 21b installed in parallel with the flow direction (X-axis) of the exhaust gas in emission inlet-port 19b of an inner shell 19. It is what has the description in the configuration of two or more adjoining plates 21a and 21b in the cross section (y-z cross section) in the direction of a major axis (the direction of the z-axis) which intersects perpendicularly with the configuration of the longitudinal direction (the direction of a x axis) of one plate 21a and 21b, or a longitudinal direction (the direction of a x axis). It is not limited to the surface roughness of each plates 21a and 21b. For example, surface roughness can be enlarged or irregularity and a dimple can also be formed in a front face in order to increase the surface area of the collection-of-heat fin 21.

[0063] Furthermore, although the collection-of-heat fin 21 and the inner shell 19 were manufactured with the stainless steel plate in this invention, depending on the temperature or the component of exhaust gas to be used, thermal conductivity can also use other good metals. For example, copper, true **, aluminum, an aluminium alloy, iron, an iron alloy, carbon steel, Inconel, Hastelloy, Monel, etc. can be mentioned. Moreover, another metal layer and a ceramic layer can also be formed partially [the collection-of-heat fin 21 or the inner shell 19 inner surface] or extensively in order to control the self-target which enlarges surface area of the front face of these metals, the purpose which raises endurance, the purpose which raises thermal conductivity, and heat deformation.

[0064] The exhaust heat power plant (Ha) shown in drawing 6 (A) and (B) is drawing showing the example of a comparison, and the collection-of-heat fin 21 which becomes from two or more plates 213 of the same height inside heat collecting surface 19a of an inner shell 19 counters along with the longitudinal direction (the direction of a x axis) of heat collecting surface 19a, and it is formed in one. Exhaust heat power-plant (d) shown in drawing 7 (A) and (B) is drawing showing the example of a comparison, and has not formed the collection-of-heat fin 21 inside heat collecting surface 19a of an inner shell 19.

[0065] Next, each exhaust heat power-plant (b) shown in drawing 4 thru/or drawing 7 - (d) were connected to the exhaust pipe of the 3l. engine of DOHC(s), and the skin temperature of an inner shell

19 was measured for 3 minutes after after [temperature saturation] 30-minute maintenance under the service condition of engine-speed 3000rpm, torque 12kgm, boost-255mmHg, fuel consumption 14.9 L/h, the water temperature of 73.6 degrees C, 79 degrees C of oil temperatures, the oil pressure of 4.2kg/cm2, the intake-air temperature of 3.1 degrees C, and 15m/s of cooling wind speeds. In addition, they were the exhaust-gas temperature of 640 degrees C of an inlet port, and 40 degrees C of outside air temperature.

[0066] In addition, the collection-of-heat fin 21 of exhaust heat power-plant (b) shown in drawing 5 In plate 21a from which fin height serves as a peak price Fxh at the emission entrance-side 19b side Are the peak price section-minimum value section-peak price section-minimum value section-peak price section-minimum value section, and the dimension is 440mm and sets the overall length of 100-60-60-60-60 to 100 mm, and the collection-of-heat fin 21 to the emission inlet-port 19b side. In plate 21b used as the minimum value Fxl, fin height has relation contrary to ****.

[0067] Moreover, a peak price Fxh is become to 17mm, and, as for 8.5mm and fin thickness, 3mm and installation spacing (the direction of the z-axis) have become [the minimum value Fxl] 4mm. in addition -- drawing 4 -- being shown -- exhaust heat -- a power plant -- (**) -- a collection of heat -- a fin -- 21 -- being high -- a plate -- 21 -- a -- drawing 5 -- being shown -- exhaust heat -- a power plant -- (**) -- a collection of heat -- a fin -- 21 -- a peak price -- the same -- being low -- a plate -- 21 -- b -- drawing 5 -- being shown -- exhaust heat -- a power plant -- (**) -- a collection of heat -- a fin -- 21 -- the minimum value -- the same -- drawing 6 -- being shown -- exhaust heat -- a power plant (Ha) -- a collection of heat -- a fin -- 21 -- drawing 5 -- be shown -- exhaust heat -- a power plant -- (b) -- a collection of heat -- a fin -- 21 -- the minimum value -- being the same .

[0068] Moreover, the installation spacing L, the board thickness T, and the overall length of Plates 21a and 21b of all the collection-of-heat fins 21 are the same, and the conditions of others of all exhaust heat power-plant (b)s - (d)s are the same. The result is shown in drawing 8 . The skin temperature of an inner shell 19 had most highly about 450-degree C exhaust heat power-plant (**) (height difference level difference fin) which formed the collection-of-heat fin 21 which consists of two or more plates 21a and 21b with which the opposed face side shown in drawing 5 has a level difference 212 in the shape of a pulse shape so that clearly from drawing 8 .

[0069] In the collection-of-heat fin 21 shown in drawing 5 , this reason is considered because exhaust gas temperature can be certainly spread to the collection-of-heat fin 21, in order to spread exhaust gas, to branch to two or more passage and to cause disturbance reduction with the level difference 212 which makes the shape of a pulse shape by the side of an opposed face, as shown in drawing 9 . Next, it was about 410 degrees C in exhaust heat power-plant (**) (height difference continuation fin) which formed the collection-of-heat fin 21 which consists of two or more plates 21a and 21b with which the height shown in drawing 4 differs.

[0070] Next, it was about 300 degrees C in the exhaust heat power plant (Ha) (only continuation fin) which formed the collection-of-heat fin 21 which consists of two or more plates 213 of the same height shown in drawing 6 . Exhaust heat power-plant (**) (with no fin) without the collection-of-heat fin 21 shown in drawing 7 was the lowest, and was about 230 degrees C. Next, the result of having measured exhaust air differential pressure by drawing 10 is explained.

[0071] Exhaust heat power-plant (**) (with no fin) without the collection-of-heat fin 21 shown in

drawing 7 with a natural thing was the lowest, and were about 3 mmHg(s). Next, they were about 5 mmHg(s) in the exhaust heat power plant (Ha) (only continuation fin) which formed the collection-of-heat fin 21 which consists of two or more plates 213 of the same height shown in drawing 6 . Next, they were about 9 mmHg(s) in exhaust heat power-plant (**) (height difference continuation fin) which formed the collection-of-heat fin 21 which consists of two or more plates 21a and 21b with which the height shown in drawing 4 differs.

[0072] Next, the opposed face side shown in drawing 5 was about 11 to 12.3 mmHg in exhaust heat power-plant (**) (height difference level difference fin) which formed the collection-of-heat fin 21 which consists of two or more plates 21a and 21b which have a level difference 212 in the shape of a pulse shape. It equipped with the catalytic converter for exhaust air purification usually used instead of the thermoelectric generation equipment of this operation gestalt, and ventilation resistance was measured similarly. The ventilation resistance at the time of equipping with a catalytic converter was 100 - 150mmHg.

[0073] That is, the exhaust air differential pressure of exhaust heat power-plant (b) is small enough as compared with the exhaust air differential pressure of a catalytic converter, and does not become trouble so much at an engine drive. According to the thermoelectric generation equipment which has the description in the collection-of-heat fin configuration of this invention as mentioned above, ventilation resistance can be small and can raise collector efficiency. Furthermore, thermoelectric generation effectiveness was able to be raised by being able to manufacture in compact magnitude and configuration which can be mounted, and raising gaseous diffusion effectiveness, without covering an unnecessary load over the engine for mount, and degrading a transit property.

[0074]

[Effect of the Invention] As stated above, in claim 1 thru/or an exhaust heat power plant according to claim 10 Since the collection-of-heat fin is constituted by arranging in parallel two or more plates with which height differs in the direction of a major axis which intersects perpendicularly with the heat collecting surface of a container liner to the flow direction of exhaust gas to the flow direction of exhaust gas Without increasing the ventilation resistance of the exhaust gas which flowed into the container liner from an exhaust pipe, the collection of heat of the exhaust heat of exhaust gas can be efficiently carried out through a collection-of-heat fin, it can conduct to the elevated-temperature end face of a thermoelectrical conversion module, and it becomes possible to heat the elevated-temperature end face of a thermoelectrical conversion module.

[0075] Furthermore, since heat is radiated on the outside of an outer case from the radiation fin with which the heat of the low-temperature end face of a thermoelectrical conversion module was really formed in coincidence through the heat sinking plane of an outer case and the low-temperature end face of a thermoelectrical conversion module is cooled, while becoming possible to enlarge a generation-of-electrical-energy output, it becomes possible to offer a compact exhaust heat power plant. Moreover, the plate with which the upstream of exhaust gas begins from Takabe while a collection-of-heat fin has Takabe and a pars basilaris ossis occipitalis by turns to the flow direction of exhaust gas, In the direction of a major axis which intersects perpendicularly to the flow direction of exhaust gas while having Takabe and a pars basilaris ossis occipitalis by turns and the upstream stands erect in parallel the plate which begins from a pars basilaris ossis occipitalis to the approach exhaust gas flows Since it is constituted by more than one's standing erect by turns in a heat collecting surface, and arranging to it, even when this exhaust heat power plant is used for the exhaust air system for automobiles, exhaust air

differential pressure is stopped by the level which does not pose a problem, covers an unnecessary load over car motor, and does not degrade a transit property.

[0076] While being able to raise collector efficiency moreover, thermoelectric generation effectiveness can be raised by being able to manufacture in compact magnitude and configuration which can mount this exhaust heat power plant, and raising gaseous diffusion effectiveness. **.

[Translation done.]

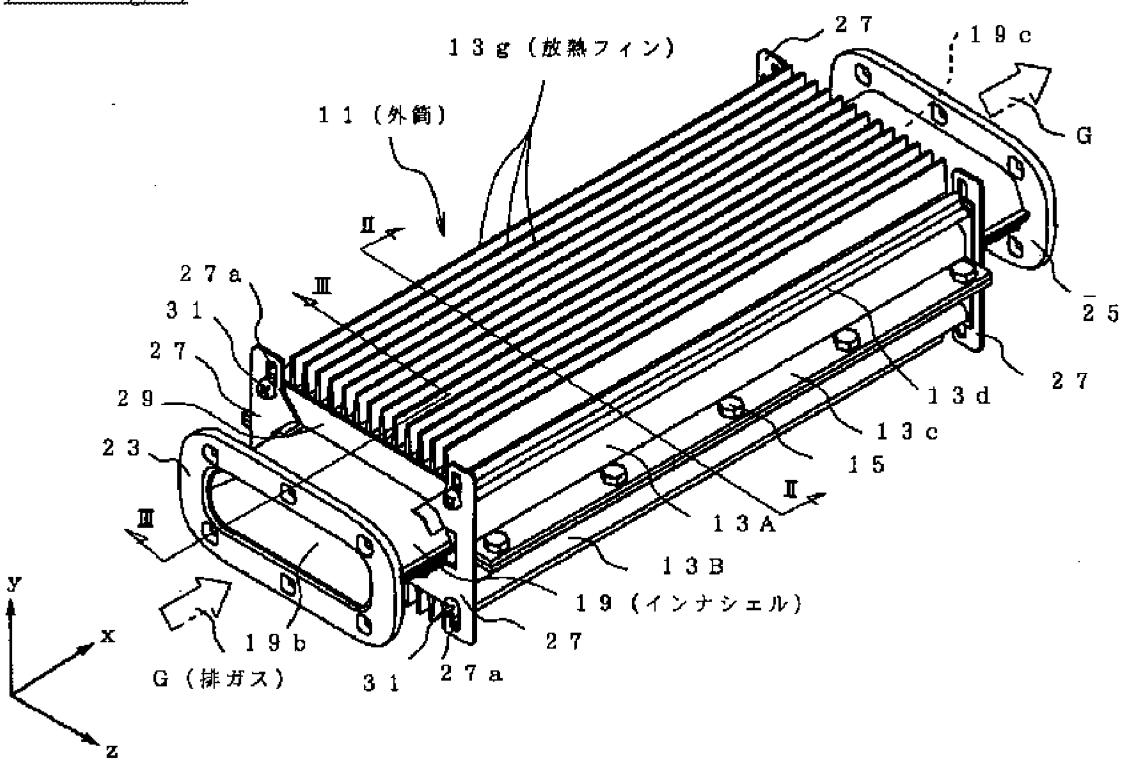
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing 1 operation gestalt of the exhaust heat power plant of this invention.
[Drawing 2] It is the sectional view which meets the II-II line of the exhaust heat power plant of drawing 1 .
[Drawing 3] It is the sectional view which meets the III-III line of the exhaust heat power plant of drawing 1 .
[Drawing 4] It is the sectional view showing other operation gestalten of the exhaust heat power plant of this invention.
[Drawing 5] It is the sectional view showing other operation gestalten of the exhaust heat power plant of this invention.
[Drawing 6] It is the sectional view showing the exhaust heat power plant concerning the example of a comparison of this invention.
[Drawing 7] It is the sectional view showing the exhaust heat power plant concerning the example of a comparison of this invention.
[Drawing 8] It is the graph which shows the skin temperature of the inner shell of the exhaust heat power plant of this invention.
[Drawing 9] It is the explanatory view showing the condition of the exhaust gas in the inner shell of the exhaust heat power plant of this invention.
[Drawing 10] It is the graph which shows the exhaust air differential pressure measurement result in the exhaust heat power plant of this invention.
[Drawing 11] It is the perspective view showing the conventional exhaust heat power plant.
[Drawing 12] It is the perspective view showing the conventional exhaust heat power plant.
[Description of Notations]
11 Outer Case
13a Heat sinking plane
13g Radiation fin
19 Inner Shell (Container Liner)

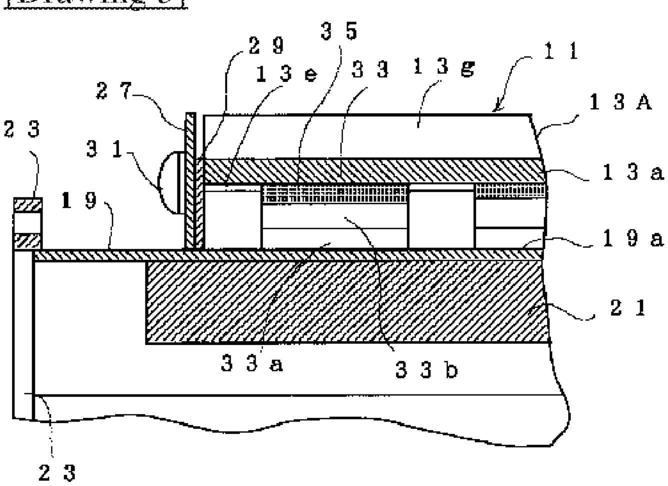
19a Heat collecting surface
21 Collection-of-Heat Fin
21a, 21b Plate
33 Thermoelectrical Conversion Module
33a Elevated-temperature end face
33b Low-temperature end face
35 Buffer Member
G Exhaust gas

DRAWINGS

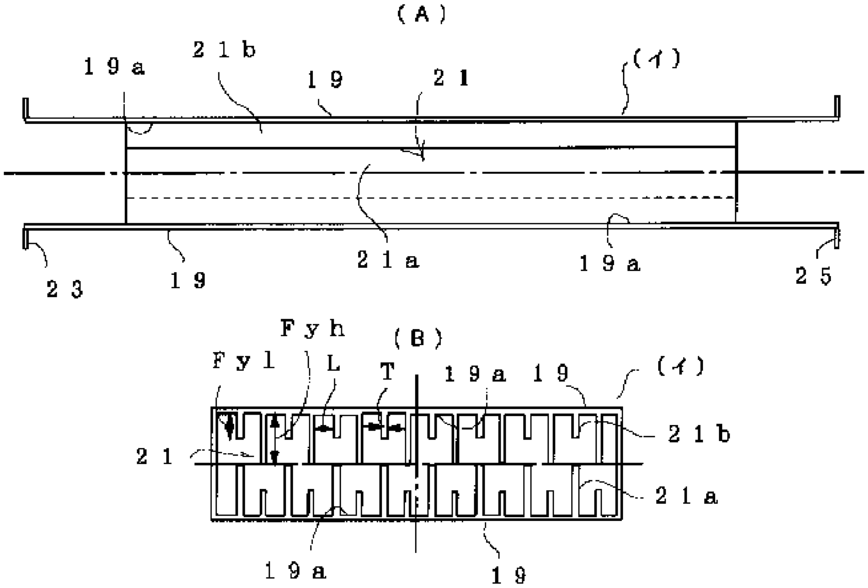
[Drawing 1]



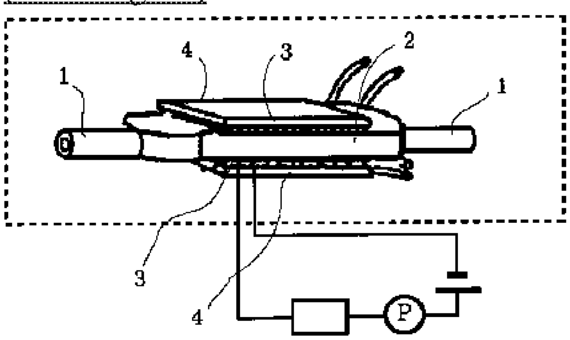
[Drawing 3]



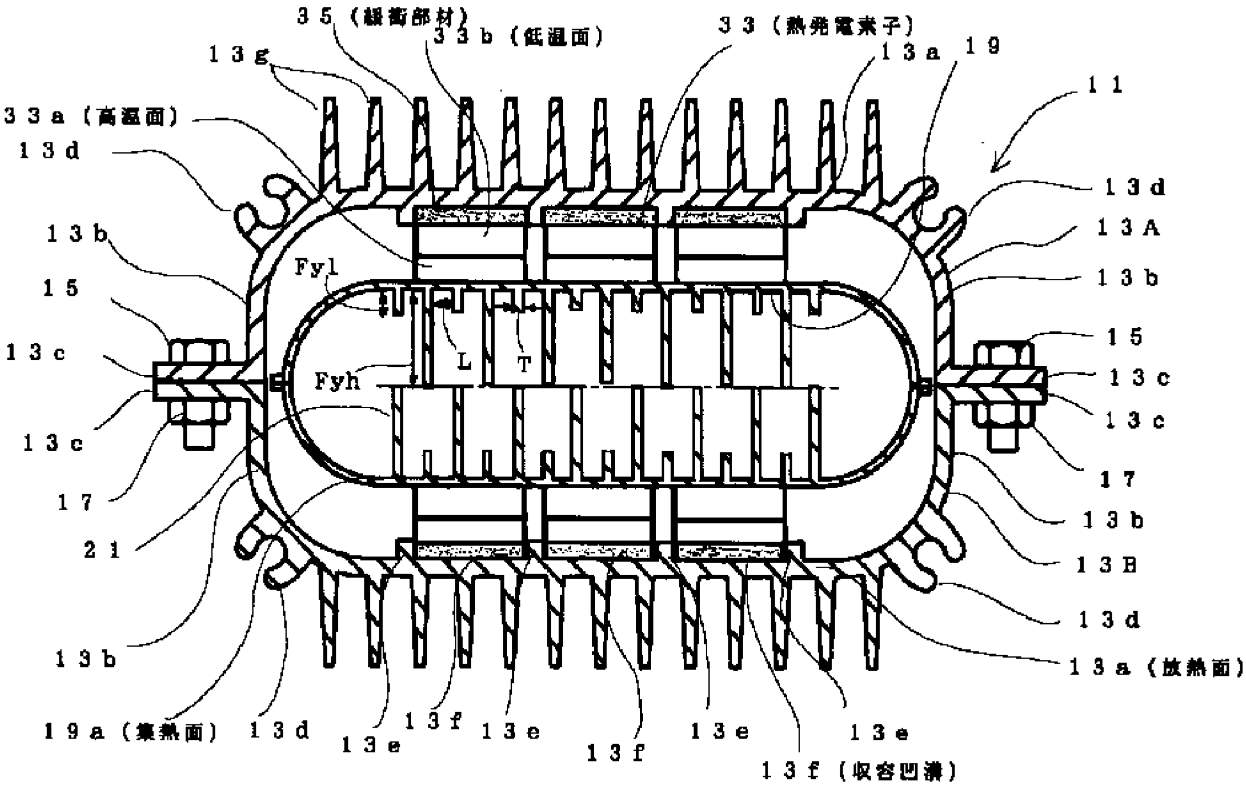
[Drawing 4]



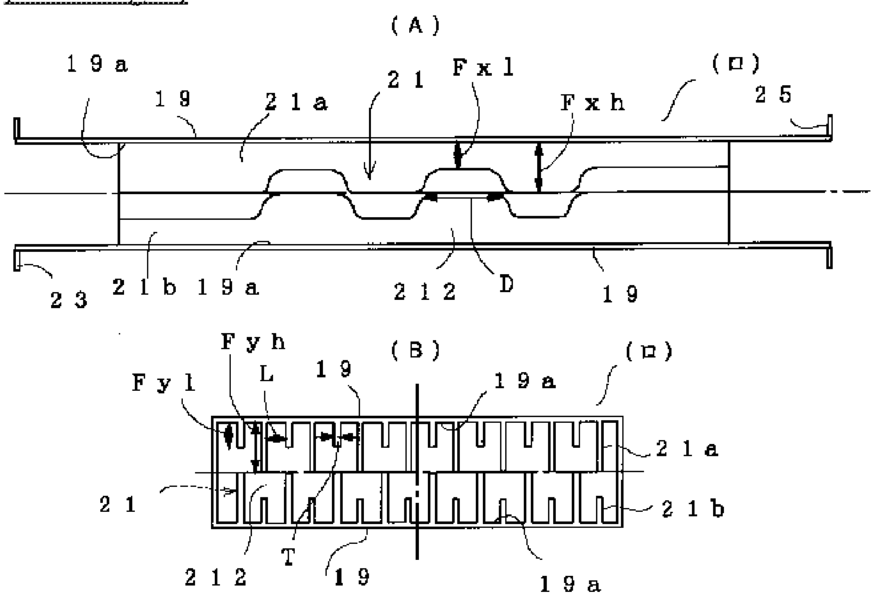
[Drawing 11]



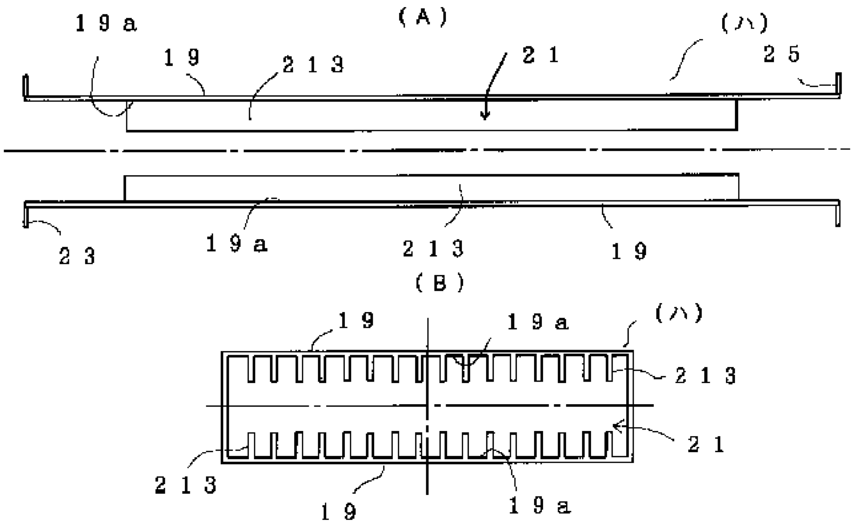
[Drawing 2]



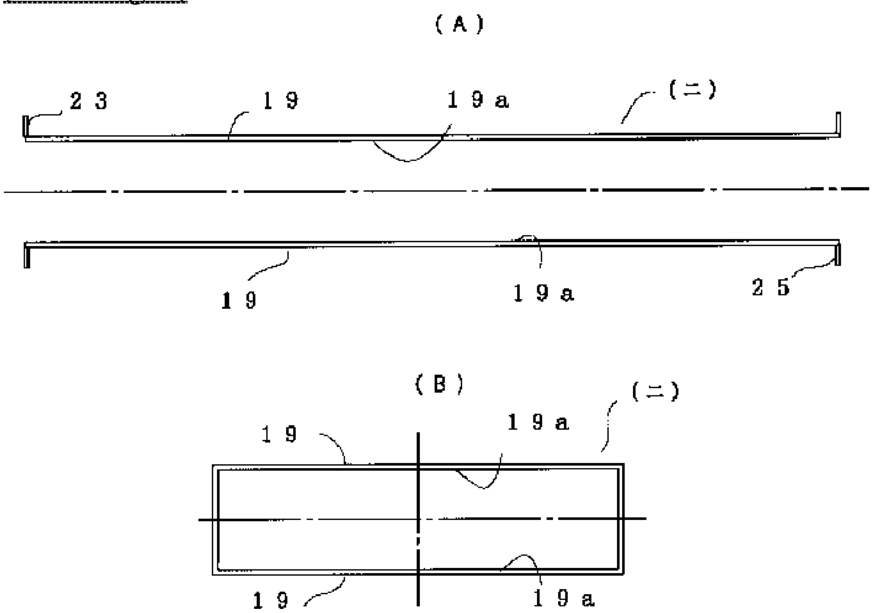
[Drawing 5]



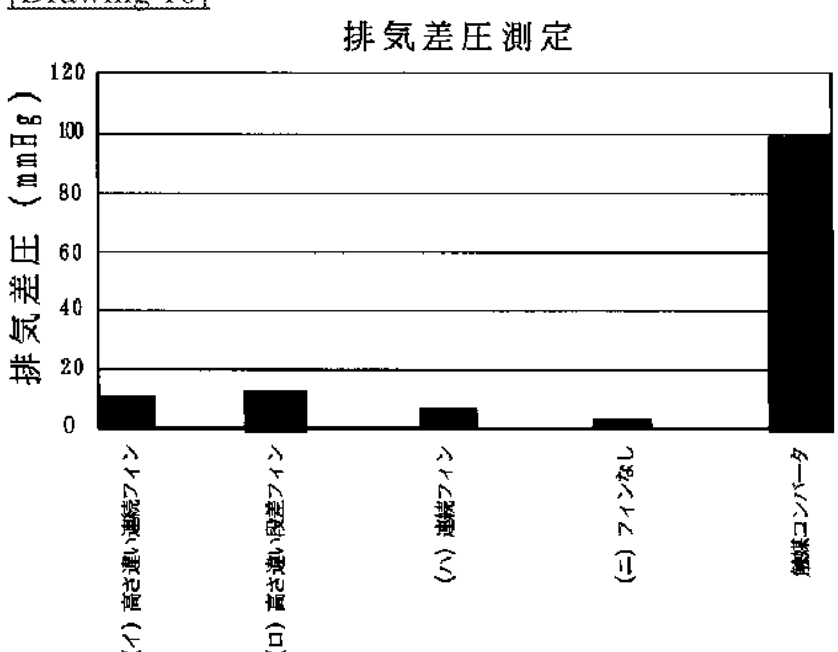
[Drawing 6]



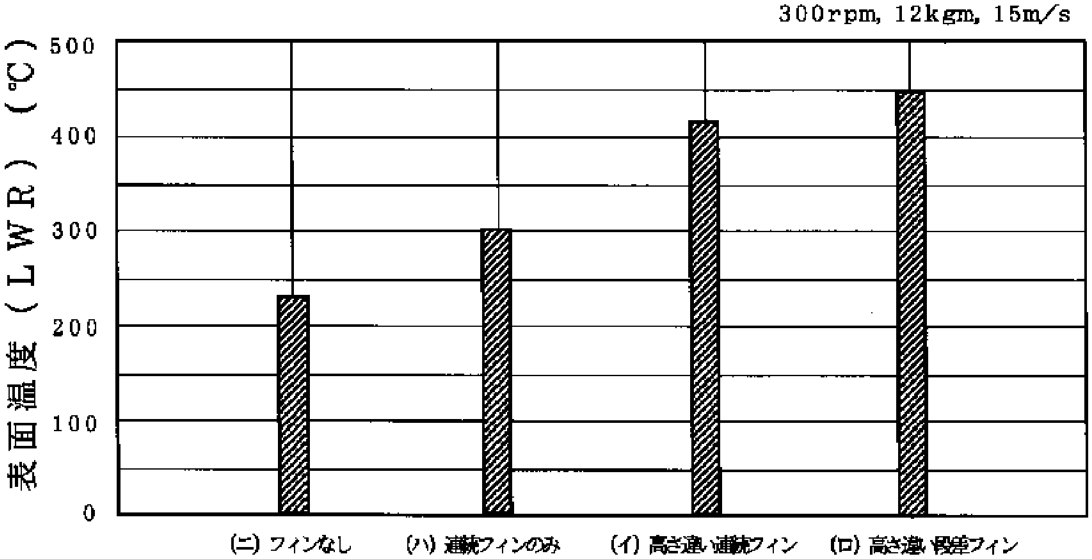
[Drawing 7]



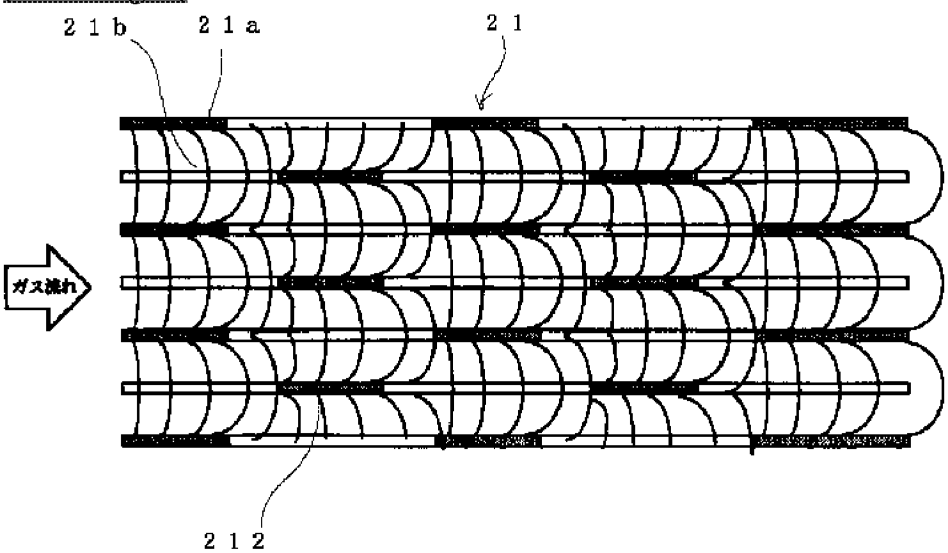
[Drawing 10]



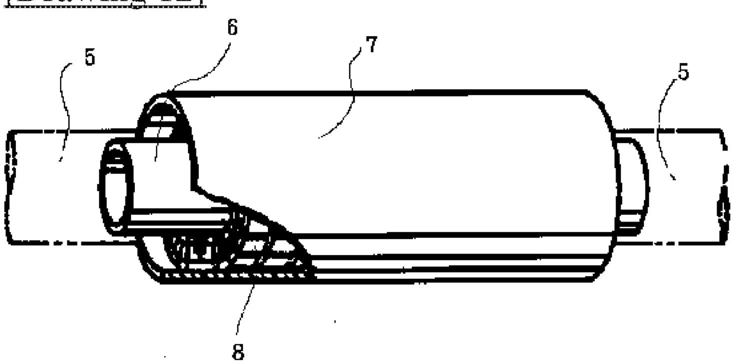
[Drawing 8]



[Drawing 9]



[Drawing 12]



[Translation done.]